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HERPETOFAUNA OF THE ISLANDS OF THE
ARGO-SARONIC GULF, GREECE

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Collections were made between summer 1962 and winter 1965-66 on the Greek offshore islands of Poros, Hydra, and Spetsai. These islands lie in the Argo-Saronic Gulf, close to the northeast coast of the Peloponnese, to which the herpetofauna is closely allied (fig. 1).

All the islands have a mild winter climate—frost is rarely recorded at sea level and snow cover almost unknown. The summers are long, hot, and dry with the months May to September inclusive virtually rainless. Total rainfall, as measured by the author on Spetsai, is under 20 inches annually. Surface water is present throughout the summer on Poros, but on Hydra and Spetsai the raising of the water table produces ponds and streams only during the rainy season. Hence amphibian life is scanty.

With the exception of seasonal grain crops, olive groves, and a few vineyards there is little cultivation—this applies especially to Hydra which is mountainous and steep. Poros has extensive pine forest—the resin is tapped to flavor the local wine—and Spetsai has plenty of trees on the narrow ridge crowning the top of the island and on the southern flank. Contrary to the situation on the mainland and the Cyclades, there is little grazing by goats and sheep, so, despite the meager rainfall, the wooded areas are able to survive. Apart from the poorly cultivated areas and pine forests, the vegetation is primarily Garigue (Polunin and Huxley, 1966), characterized by asphodels in the autumn and early spring with *Cistus* spp. and *Origanum onites* predominating, together with *Poterium spinosum*. Growth is more shrubby in the gullies and toward the pine forests.

Compared with the Cyclades, reptile life is rather disappointing. Two dominant elements of the Cyclades, *Vipera ammodytes meridionalis* and *Lacerta erhardii*, are sparsely distributed on the adjacent mainland. On the

TABLE 1. *Distribution of herpetofauna on the Cyclades, Peloponnese adjacent mainland, and Argo-Saronic islands. (+ = definite record, — = probably absent, ? = unrecorded, but probably present.)*

	Cyclades	Mainland	Poros	Hydra	Spetsai
<i>Bufo viridis</i>	+	+	?	?	+
<i>Rana ridibunda</i>	+	+	+	—	—
<i>Hyla arborea</i>	+	+	—	—	—
<i>Testudo graeca iberica</i>	—	+	+	—	+
<i>Clemmys caspica rivulata</i>	+	+	—	—	—
<i>Agama stellio</i>	+	—	—	—	—
<i>Hemidactylus turcicus</i>	+	+	?	?	+
<i>Cyrtodactylus kotschy</i>	+	+	+	+	+
<i>Algyroides moreoticus</i>	—	+	—	—	—
<i>Lacerta erhardii</i>	+	+	—	+	—
<i>L. graeca</i>	—	+	—	—	—
<i>L. peloponnesiaca</i>	—	+	—	—	—
<i>L. taurica</i>	—	+	—	—	—
<i>L. trilineata</i>	+	+	+	+	+
<i>Ablepharus kitaibelli</i>	+	+	+	+	+
<i>Chalcides ocellatus</i>	Kea only	?	+	+	—
<i>Typhlops vermicularis</i>	+	+	—	—	—
<i>Eryx jaculus turcicus</i>	+	+	?	?	+
<i>Coluber jugularis caspius</i>	+	+	?	?	+
<i>C. najadum dahlii</i>	—	+	+	?	+
<i>Elaphe quatuorlineata</i>	+	+	?	?	+
<i>E. situla</i>	+	+	?	?	+
<i>Malpolon monspessulanus insignitus</i>	—	+	+	+	—
<i>Natrix n. persa</i>	+	—	—	—	—
<i>Telescopus fallax</i>	+	?	—	—	—
<i>Vipera ammodytes meridionalis</i>	+	+	—	—	—
<i>V. lebetina schweizeri</i>	+	—	—	—	—

islands in question, the former is completely absent and the latter confined to Hydra. Table 1 compares the distribution of species between mainland, Argo-Saronic Gulf islands, and the Cyclades. In general, although a number of species are represented on these islands, in no case are they particularly abundant. Aigina and Salamis also fall within this group of islands, but their herpetofauna is unknown. Below follows a discussion of material collected by the author. Detailed descriptions of species are not given unless exhibiting some special feature. In all cases detailed descriptions are given by Hellmich (1962), and may be referred to by the reader.

The specimens forming the basis of this report have been deposited in part in the herpetological collections of The California Academy of Sciences; a representative series has been retained by the author.

COMMENTS ON NOMENCLATURE

Basically the taxonomic arrangement of Mertens and Wermuth (1960) is adhered to. In two instances, however, subspecific rank has been omitted: *Cyrtodactylus kotschyi (saronicus)*, and *Lacerta erhardii (livadhiaca)*.

AMPHIBIA

Bufo viridis viridis (Laurent) (green toad).

This species occurs on Spetsai but has not been observed on either Hydra or Poros. It is not found abroad in summer owing to the total lack of water, but the author has found it from time to time in the autumn and winter both by day and night usually after rain. Two specimens, both males, were caught on 29 September 1962 after a thunderstorm in the neighborhood of an old stone wall; they measured 69 mm. and 51 mm. in body length.

Spawning takes place between January and April with the toads remaining in the vicinity of the ponds. The ponds in question are small—3 meters by 1 meter at most—and completely dependent on the rainfall, although once formed usually persist until mid-May. Visits were made weekly and thus a detailed series of observations were obtained over three seasons, 1963–65. Mating was actually observed on 19 February 1963, 1 April 1965, and 5 February 1966. In 1964, spawn was first observed on 7 February, in 1965 on 9 January, and in 1966 on 1 February. Fresh batches appeared throughout the seasons, the last being seen on 25 March, in 1964 and 8 April in 1965. Development was very quick after these late spawnings. One pond which had no fresh spawn on 1 April had baby tadpoles on 8 April, whereas spawn laid in January and early February took about three weeks to reach the same stage of development. Metamorphosis was complete by 20 May 1963, the same date in 1964 and by 18 May 1965, though on 27 May 1965 tadpoles that had not yet developed hindlimbs were seen. Of the several ponds visited the majority dried up before metamorphosis was completed and fluctuations in the water level throughout the season resulted in many batches of spawn being left stranded. Spawn laid as late as April probably has little chance of developing. Clearly it would only take three or four abnormally rainless years to threaten the toad population on Spetsai. As it is, the casualty rate must be enormous.

Rana ridibunda ridibunda Pallas (marsh frog).

This frog is absent from Spetsai and probably Hydra too; it occurs in isolated colonies on Poros. A single specimen was seen in a small stream among pine forests on 28 September 1963, thus indicating that water persists throughout the year in suitable localities. Additional specimens were seen in deep, disused wells at sea level not far from the town. Though very much more de-

pendent upon water than *Bufo viridis*, this frog occurs on the mainland where it is forced to aestivate owing to the summer drought. Nevertheless the mainland gets a higher rainfall than Spetsai.

REPTILIA
TESTUDINATA

Testudo graeca ibera Pallas.¹

This species occurs in considerable numbers on the hillsides of Spetsai and Poros but so far is unrecorded from Hydra. It is frequent in the autumn and spring, but is less evident in the summer when the supply of food becomes short. Its ability to fast for long periods is testified to by a specimen kept in the author's back garden on Spetsai for three months in the summer with no food at all. In the autumn it was still in fine condition and has survived a further two years. Adult tortoises frequently reveal their whereabouts by crashing noisily through the undergrowth, juveniles often escaping detection. In the spring, the mating season, several specimens have often been seen together, but autumnal courtship also was observed on Poros (Clark, 1963) and subsequently on Spetsai. *Testudo graeca ibera* attains a large size, often up to 300 mm. over the carapace, the largest caught by the author measuring 328 mm.

The carapace is dark in color with yellow centers to the plates, but these are often much reduced and sometimes absent. The plastron is yellow with black triangular patches. Most specimens examined had a number of tortoise ticks—*Hyaloma aegyptium*—adhering round the forelimbs and anus.

LACERTILIA

Hemidactylus turcicus turcicus (Linné) (disc-fingered gecko).

SPECIMENS EXAMINED. *Spetsai*—12 adults, 2 juveniles.

DISCUSSION. This small gecko is entirely crepuscular or nocturnal. All specimens taken by day were found by accident as a result of turning over a stone or tearing apart a pile of rubbish. In the evening they were found in and around houses and also on stone walls and along the edges of fields. Evidently this gecko is fairly common, although it has not been found on Hydra or Poros. It almost certainly exists on these islands as it is an extremely widespread species. Body length ranges from 27 to 52 mm.

Cyrtodactylus kotschy Steindachner (naked-fingered gecko).

SPECIMENS EXAMINED. *Hydra*—3 adults, 2 juveniles; *Spetsai*—2 adults, 1 juvenile.

DISCUSSION. On Spetsai this lizard is not as common as *Hemidactylus t.*

¹ For the sake of simplicity I am calling the species concerned by this name; however, it also has features common to *T. marginata*.



FIGURE 1. Map of the Argo-Saronic islands and adjacent Peloponnesian mainland, Greece.

turcicus. A small colony was seen in a deserted windmill in July 1962, and individuals have been observed from time to time since then. Even in the heat of summer they were active during the day, though seeking shade at the hottest time.

On Hydra this species evidently occurs in large numbers. Eighteen were seen in 3 days in November 1963. It was also seen on Poros in April 1963, but no specimens were taken.

The coloring is gray, rather than flesh-pink, with transverse wavy bars. Body lengths ranged from 24 to 50 mm.

Werner (1937) has described a subspecies *saronicus* from Hydra and Salamis. However, the specimens obtained from Hydra and those from Spetsai show no dissimilarities with specimens from the Cyclades, so I cannot accept Werner's taxonomic arrangement.

Lacerta erhardii Bedriaga (wall-lizard).

SPECIMENS EXAMINED. *Hydra*—3 females, 2 males.

DISCUSSION. Mertens and Wermuth (1960) list the subspecies *L. e. livadhiaca* Werner from Hydra and mainland Greece. The taxonomy of this species has been made highly complex and this subspecies may or may not be justified. The coloring in females was brownish above with a dorsolateral and a lateral white stripe. The males were fawn-gray with faint light stripes, absent laterally, and a broken black network over the ground. The underside was tinged with orange in the females, while the male lizards obtained were markedly orange-red ventrally, as were specimens observed at the foot of Mount Parnes in Attica in April 1963.

The habitat of this species in Hydra appears to be very narrow—a rocky hilly area immediately overlooking the harbor which gets sunshine throughout the day, even in winter. Specimens were seen in the same area in November 1963, extending up to about 1000 feet. Above this altitude no specimens were seen. In 1963, 11 were counted but only three in 1965. A further five specimens were seen in February 1966. Other parts of the island yielded no specimens at all.

The body lengths for the males were 56 and 53 mm. and for the females, 48, 48, and 57 mm. A comparison with adults of *L. erhardii* from the Cyclades indicates that the Hydra specimens are a smaller race. No juveniles were seen and no noticeably larger adults. Ventrals range from 22 to 25 in 8 longitudinal rows, dorsals from 46 to 54, femoral pores 19 to 23, and collar 10 to 11. No small lacertids occur on Spetsai, and none have been seen on Poros although the close proximity (about 400 meters) of the mainland increases the likelihood of their being present.

Lacerta trilineata Bedriaga (green lizard).

SPECIMENS EXAMINED. *Hydra*—1 male, 1 female; *Spetsai*—6 males, 8 females, 6 juveniles.

DISCUSSION. This is the only lacertid lizard on Spetsai, where it is not uncommon, both at sea level among the spiny bushes and fields as well as on the hills in and among the pine forests. One of the Hydra specimens came from a rocky outcrop, with bushes at the base, and the other from more open hillside with low spiny shrubs as the main form of cover. *Lacerta trilineata* has also been observed on Poros, but no specimens have been taken.

Male lizards are green above with black or brown flecks and yellow or

TABLE 2. *Lacerta trilineata* Bedriaga (lengths in mm.)

	Sex	Body length	Total length	Head length	Orbital breadth	Temporal breadth
MAINLAND	J	47	148	16	6.5	9
	J	50	160	12	6.5	8.5
	J	51	141+	12	6.5	8
	J	58	173	13.5	6.5	9
	J?	97	312	19.5	9	14
	♀	117	397	26.5	11	18
	?	130	430	27	13	19
	?	133	375	30	13	19.5
	♂	150	495	36	15	27
	♂	151	523	41	16	27
	♂	155	433	35	14	25
	♂	160	525	37	14	26
	♂	160	530	40	16	30
SPETSAI	J	39	119	8.5	6	7
	J	40	117	11	6	7
	J	41.5	126	10.5	6	7.5
	J	45	140	10	5.5	7
	J	46	137	11.5	6	7
	J	80	270	17	8	12
	♀	105	127+	22	10	14.5
	♀	105	360	25	11.5	17
	♀	115	285+	23	11	17
	♀	118	370	24	10	17
	♂	121	340	24.5	11	18
	♂	125	310	32	13	23
	♂	126	416	30	13	21
	♂	127	402	28	12	19
	♀	130	415	26	13.5	18.5
	♀	130	388	24	11	17
	♀	131	379	24	11	15.5
	♂	134	364	25	11.5	18.5
♂	145	305+	32	12	21	
♀	148	428	28	12.5	22	

cream below: the throat is never blue (contrast *L. viridis*). Females are more variable and tend to retain the white stripes of the juveniles, usually in the form of broken spots. The 270 mm. individual was of particular interest as intermediate-sized specimens are rarely seen. This was colored like the juveniles, *i.e.*, a uniform chocolate brown above with three white stripes dorsally and a row of white spots down each flank. Sometimes in young juveniles the lateral spots become confluent to form a stripe. Only one juvenile exhibited unusual markings: there was a complete absence of the stripes, the ground color being mottled with darker fawn-brown.

In general appearance mainland representatives of *L. trilineata* are bigger and more massive than those on Spetsai. This is shown both in body lengths and head breadth (table 2) and females are more slender in build. The ratio total length/body differs for the two groups and for males, females, and juveniles within the Spetsai populations. Females give the highest ratio with a mean of 3.23, juveniles are 3.02, and males 2.78. For the mainland, males have a mean of 3.23, and juveniles 3.11. The single female had a ratio of 3.39. Thus, on the mainland, the males have bigger bodies and proportionately longer tails, making a much larger individual altogether. On Spetsai, the high ratio for females compared with males means that the females have longer tails than the males. Quantitatively, the product $H \times H_b$ (where H is head length and H_b is temporal breadth) can be used as a measure of "bulk." In figure 2, $H \times H_b$ is plotted against body length, and the points lie close to a curve. The flattening of the curve for both groups is related to growth rate. Within any one group body length tends to a maximum (148 mm. for Spetsai and 160 mm. for the mainland) at which the bulk, exemplified by $H \times H_b$, may increase with age. This bulk is considerably greater for the mainland specimens than for Spetsai, with which there is practically no overlap, either for juveniles or fully grown adults. Of interest are two intermediate specimens, the 270 mm. (body length 80 mm.) individual from Spetsai and another from the mainland of 117 mm. body length which fall into the same sequence. Further analysis shows these properties are related by the formula

$$\log_{10} H \times H_b = kB$$

where k , a constant, is 0.01 for both groups and B is body length, the points lying close to the straight line.

The Hydra examples seem to be bigger than those from Spetsai but more specimens are needed for a valid comparison. In spite of the small size of the Spetsai specimens, they have been positively identified by Dr. K. Klemmer, of the Senckenberg Natur-Museum und Forschungs-Institut, Frankfurt, as *L. trilineata* rather than *L. viridis*. Ventrals are in eight rows and granules are present between the supraciliaries and supraoculars. As mentioned above, the throat is never blue. The juveniles show the three or five dorsal and lateral white stripes characteristic of *L. trilineata* (Boulenger, 1887). Ventrals ranged from 23 to 27, dorsals from 44 to 56, except for two juveniles which had 39 and 65, femoral pores were 16 to 21, and collar 7 to 11.

Ablepharus k. kitaibelli Bibron and Bory (snake-eyed skink).

SPECIMENS EXAMINED. *Poros*—2; *Hydra*—2; *Spetsai*—6.

DISCUSSION. This little skink is not an uncommon species though its small size renders it inconspicuous. It is thoroughly sun-loving, but all examples were seen and caught in the spring and autumn, often in damp localities or

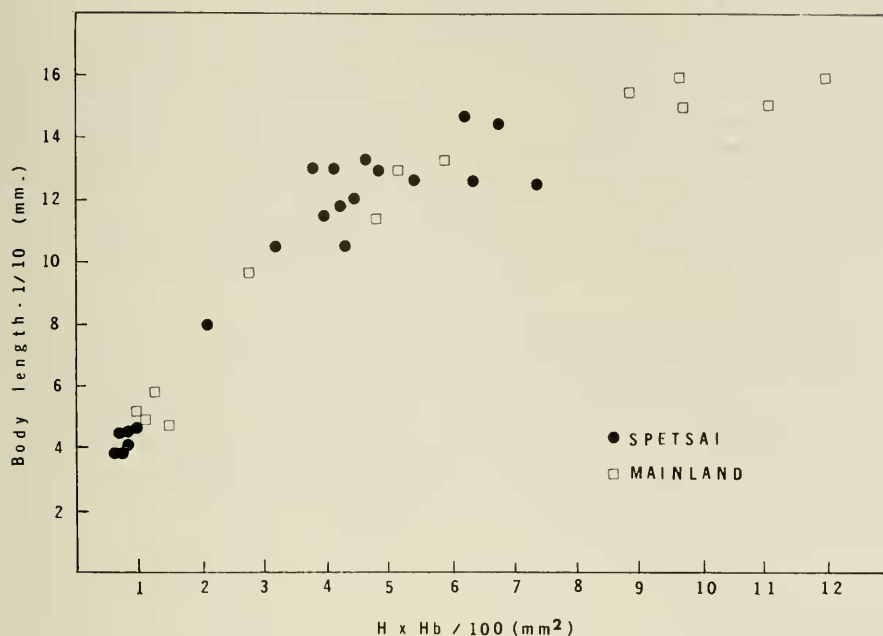


FIGURE 2. *Lacerta trilineata*—variation of “bulk” of head ($H =$ head length, $H_b =$ temporal breadth) compared to body length.

after rain. Body measurements are given in table 3. Limbs are included to show their extremely small size.

Chalcides ocellatus ocellatus (Forsk.) (eyed skink).

SPECIMEN EXAMINED. *Poros*—1.

DISCUSSION. This is the first definite record of this species for the area. Another specimen was seen on *Hydra* but evaded capture. Its existence on

TABLE 3. *Ablepharus kitaibelli kitaibelli* Bibron and Bory (lengths in mm.)

Locality	Total length	Snout to vent	Forelimb	Hindlimb
Poros	75	38	5	8
	82	38	5.5	8
Hydra	72+	39	6	9
	50+	35	6	9
Spetsai	93	34	5	9
	63	25	5	8
	92.5	37	5.5	9
	95.5+	43.5	6.5	10
	105	33.5	6	10
	97	41	6.5	9.5

TABLE 4. *Chalcides ocellatus ocellatus* (Forsk.) (lengths in mm.)

Total length	169 (tail regrowth)
Snout to vent	115
Length head	13
Breadth head orbital	4
Breadth head temporal	6
Length forelimb	20
Length hindlimb	27
Scales round body	34 rows (midbody count)

Poros is not surprising, owing to the proximity of the mainland. It is unlikely that it occurs on Spetsai, and no specimen has been taken from the immediately adjacent mainland. In every respect the Poros specimens resembled others taken from Euboia and Attica. The ground color was yellow-fawn with rows of black spots, each spot having a white central stripe. The underside was pale yellow. Measurements are given in table 4.

OPHIDIA

Eryx jaculus turcicus (Olivier) (sand boa).

SPECIMENS EXAMINED. *Spetsai*—1.

DISCUSSION. This is an important find as it is the first record for Spetsai, hence for the area. Records of this snake in Greece are very incomplete. It certainly occurs on the Cyclades, *i.e.*, Naxos, Ios, Kimolos, Polygos, and some others (Bird, 1935), and on the Ionian island of Corfu (Mertens, 1961). It has also been found by the author near Epidavros on the Peloponnese mainland. The Spetsai specimen was partially damaged and was found dead on the top of the island where the ground is rough and stony. Body length was 300 mm., and vent to tail 40 mm. No other measurements were possible. The ground color was gray-yellow and reduced to a number of small irregular spots, dark-gray patches forming a connecting network across the back. This species may well inhabit Poros and Hydra.

Coluber jugularis caspius Gmelin (whip snake).

One specimen was seen by the author up a tree on Spetsai in July 1962. It evaded capture but was seen clearly enough to render positive identification. Estimated length was 5 feet or a bit more.

Coluber najadum dahlii Schinz (Dahl's whip snake).

SPECIMENS EXAMINED. *Poros*—1 adult; *Spetsai*—7 adults.

DISCUSSION. This is certainly the most commonly seen snake on Spetsai, in

spite of its small size and great agility. The largest specimen caught or seen anywhere in Greece by the author came from Spetsai and measured 1133 mm. When dissected, the stomach was found to contain three rodents about the size of half-grown tame mice. Normally it feeds on invertebrates and *Ablepharus k. kitaibelli*. Its favorite habitat is a sunny bank near an old stone wall into which it can dart when alarmed. But it is also found near the edge of paths, thickets, and woods, though never amongst the trees. The other specimens from Spetsai measured: 380 mm., 430 mm., 434 mm., 494 mm., 600 mm., and 835 mm. The Poros specimen totalled 895 mm.

***Elaphe quatuorlineata quatuorlineata* (Lacépède) (four-lined snake).**

SPECIMENS EXAMINED. *Spetsai*—2 adults, 2 juveniles.

DISCUSSION. One of the adults was found dead in a dried-out river gully, the other was caught among thick vegetation close to the sea on the south of the island. The two juveniles were brought in by local people. Hence not much opportunity has arisen for ascertaining the habitats of this snake on Spetsai itself. On the Cyclades it tolerates dry scrubby hillsides while on Euboia it has been found close to water. *Elaphe q. quatuorlineata* is a good climber, but no evidence of its presence has been found in wooded areas. The species has not been found on Hydra, Poros, nor on the adjacent mainland. The two juveniles measured 448 mm., and 431 mm., and one of the adults 1390 mm. in total length. These adults are of good size, and dorsally the ground color is clear brown, with four well developed dorsolateral and lateral stripes, showing no evidence of juvenile barrings.

***Elaphe situla* (Linnaeus) (leopard snake).**

SPECIMENS EXAMINED. *Spetsai*—1 adult, 4 juveniles.

DISCUSSION. Unlike the former species, *E. situla* was always found in, near, or around buildings and gardens. The locals sometimes complain of a snake that enters the house and this is almost certainly *E. situla*. In contrast, two specimens, both adults, caught by the author on the adjacent mainland, were found in open country with no building nearby. The Spetsai adult totalled 900 mm. and three of the four juveniles measured 389 mm., 402 mm., and 431 mm.

***Malpolon monspessulanus insignitus* (Geoffroy) (Montpelier snake).**

SPECIMENS EXAMINED. *Poros*—1 adult; *Hydra*—1 adult, 1 juvenile.

DISCUSSION. This is by far the most abundant snake on the mainland but is totally absent from the Cyclades. Previously it had been recorded from the northern Sporades and the off-shore Turkish islands, but the Hydra and Poros specimens are new records for the area. Judging by the number of specimens seen on Hydra—four or five in 2 days in February 1966—and the number of cast skins seen the previous autumn, it must be fairly common, though probably

TABLE 5. *Malpolon monspessulanus insignitus* (Geoffroy) (lengths in mm.)

Locality	Poros	Hydra	Hydra
Total length	1,235+	345	682
Snout to vent	990	270	526
Length head	27	13	17
Breadth (orbital)	13	7.5	9
Breadth (temporal)	27	9	12
Dorsals (midbody count)	17	17	17
Ventrals (anal divided)	178	165	169
Subcaudals	57 × 2+	78 × 2	83 × 2
Supralabials (nos. 4 and 5 border eye)	8 + 8	8 + 8	8 + 8

only locally. That this snake preys on *Lacerta erhardii* is absolutely certain. A further small specimen (about 500 mm. in total length) was found dead and close by a partially digested male of *L. erhardii*. The snake had probably been killed and disgorged its stomach contents. It seems highly likely that the scarcity of representatives of *L. erhardii* on Hydra in autumn 1965 and spring 1966 was connected with the increase in the abundance of *Malpolon monspessulanus insignitus*. In November 1963, *L. erhardii* was much more evident and the snake in question was not seen at all. The Poros specimen was caught at sea-level in an open cultivated valley. *Chalcides o. ocellatus* was found nearby. In spite of extensive searching on Spetsai, this species has not been found on the island and one can only conclude that the snake does not exist there. Measurements are given in table 5.

SUMMARY

1. The herpetofauna of the Argo-Saronic islands includes two amphibians, one tortoise, six lizards, and six snakes. There are no indigenous species.
2. Owing to the lack of previous reports for the area most species are recorded for the first time. However, of particular interest are *Chalcides o. ocellatus*, *Coluber najadum dahlii*, and *Malpolon monspessulanus insignitus*, as these are basically mainland forms and absent from the Cyclades, although the first two are found on Kea, close to the Attic peninsula.
3. The record for *Eryx jaculus turcicus* is valuable as knowledge of its range in Greece is very incomplete.

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